



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/826,078	04/05/2001	Christy Mei-Chu Woo	52352-767	3860

7590 10/30/2002
McDERMOTT, WILL & EMERY
600 13th Street, N.W.
Washington, DC 20005-3096

EXAMINER

DEO, DUY VU

ART UNIT	PAPER NUMBER
----------	--------------

1765

DATE MAILED: 10/30/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/826,078

Applicant(s)

WOO ET AL.

Examiner

DuyVu n Deo

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 July 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 4, 5, 7, 8 and 10-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 4, 5, 7, 8, 10-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 4, 5, 7, 8, 10, 13, 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gupta et al. (US 6,225,202), admitted prior art, and Wolf et al. (Silicon Processing for the VLSI Era).

Gupta describes a method for forming nickel silicide comprising: introducing the substrate to a deposition chamber; depositing a nickel layer on the silicon surface by sputtering;

Unlike claimed invention Gupta doesn't describe heating the chamber before introducing the substrate. Page 2 teaches that it is well known to preheat the chamber, including sputtering chamber, to accelerate the removal of contaminants from the chamber, including water vapor and other gases from the chamber components.

Unlike claimed invention Gupta doesn't describe heating the chamber throughout the deposition process. However, it would be obvious to one skilled in the art heat the chamber during deposition in order to keep process temperature constant for the deposition. Also Wolf describes the conventional process of sputtering including preheating substrate before deposition heating substrate during the deposition. It would have been obvious for one skilled in the art to

Art Unit: 1765

deposit nickel also in light of Wolf because he teaches that heating substrate during deposition improves film properties such as step coverage (page 361, 367).

Even though Gupta doesn't describe the process for a second wafer. However, it would be obvious to one skilled in the art that there are more than one wafers being processed at a time. Since it is desired to preheat the wafer before deposition as taught by Wolf for a sputtering process it would be obvious to keep the chamber heated in order to heat the second coming wafer and remain the continuous of the whole process. This would save processing time of reheating the chamber and it would increase product yield.

Referring to claims 4 and 10, Wolf also describes cleaning the substrate before depositing the nickel layer and heating substrate or chamber using lamps, backside heating and other technique (pages 361, 367).

Referring to claim 5, it would have been obvious to one skilled in the art that the power of the lamp would during the introduction of the substrate and during the deposition process would be depended on the desired T of the process and it would have been determined through test runs in order to obtain the optimum power of the lamp to provide the T for the deposition of nickel with a reasonable expectation of success.

Referring to claim 7, Gupta also describes heating the nickel layer to form nickel silicide by RTA on the gate electrode and source/drain regions; removing unreacted nickel from the substrate (col. 2-col. 3, line 35).

Referring to claims 13, 14, Gupta describes removing the unreacted nickel metal using wet etching, such as ammonium hydroxide, hydrogen peroxide, and water, are well known and practiced by one skilled in the art (col. 1, line 20-26).

Art Unit: 1765

3. Claims 11, 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gupta, admitted prior art and Wolf as applied to claim 8 above, and further in view of Chen et al. (Comparison of TiSi_2 , CoSi_2 , and NiSi for thin-film Silicon-on-Insulator Applications).

Referring to claims 11 and 12, the RTA to form nickel silicide at 550 degrees Celsius and 40s has been known to one skill in the art as taught by Chen (page 2440). And the amount of time for the RTA would have been determined through test run in order to achieve the optimum time for the complete forming of nickel silicide.

4. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gupta and Wolf as applied to claim 14 above, and further in view of Kunishima et al. (US 5,162,263).

Gupta further describes continuing processing the integrated circuit as is conventional after removal of unreacted metal. According to Kunishima shows that a conductive connection to the nickel silicide is formed without having a cap layer (col. 6, line 26-33).

Response to Arguments

5. Applicant's arguments filed 7/19/02 have been fully considered but they are not persuasive.

Referring to applicant's argument that there is no heating of the chamber between existing of one substrate and entry of the next substrate. As describe above, it is well known to preheat the substrate to improve film properties such as step coverage process taught by Wolf. It would be obvious to keep the chamber heated in order to heat the second coming wafer and remain the continuous of the whole process. This, in return, would save processing time of reheating the chamber and it would increases product yield.

Art Unit: 1765


In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n Deo whose telephone number is 703-305-0515.
DVD
October 29, 2002


BENJAMIN L. UTECH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700